IDAHO

FISH & GAME DEPARTMENT

Joseph C. Greenley, Director

FEDERAL AID IN FISH AND WILDLIFE RESTORATION LAKE AND RESERVOIR INVESTIGATIONS
Job Performance Report

Project F-53-R-9

Job IV-a. Lake Pend Oreille Creel Census (Survey) Job IV-b. Clark Fork River Census (Survey)

by
Richard A. Irizarry Fishery Research Biologist
and

Job IV-c. Kokanee Spawning Trends

by
Bert Bowler Fishery Research Biologist
Period Covered: March 1, 1973 to February 28, 1974 May,

1974

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JOB PERFORMANCE REPORT

State of Idaho Name: LAKE AND RESERVOIR INVESTIGATIONS

Project No. F-53-R-9 Title: Lake Pend Oreille Creel Census--1973
Job No. IV-a

Period Covered: March 1, 1973 to February 28, 1974

ABSTRACT:

In 1973, anglers fished an estimated 211,034 hours during 46,582 man-days to catch 337,574 fish. Kokanee and trout comprised 97% and 2% of the estimated catch, respectively.

The decline in this year's kokanee harvest is attributed predominately to a reduced commercial catch. The commercial fishery was terminated on March 31 following a dearth of shoreline spawners in 1972 and 7 consecutive years of catches less than one million kokanee.

Hatchery personnel have released 545,221 marked Kamloops rainbow since 1968. To date, an estimated 311 of 485,438 clipped fish have been caught.

Approximately 9.8% of the anglers fishing Pend Oreille resided in the Pacific and Mountain states with 2% from other states and foreign countries. In Idaho, Bonner and Kootenai counties contributed 76% of the state's anglers and 32% of all anglers fishing the lake.

Kokanee estimates from the Johnson Creek access, a partially censused landing in 1973, could have increased the overall kokanee catch by 14%.

Submitted by:

Richard A. Irizarry Fishery
Research Biologist

RECOMMENDATIONS:

Continue the creel census on Lake Pend Oreille including the Johnson Creek access.

Mark all Kamloops and Dolly Varden (with the exception of fry) planted in the lake or tributary strems.

OBJECTIVES:

To provide estimates of angling pressure and harvest of important sport fishes to:

a. Determine the size and age composition of the catch of major species.
b. Determine the contribution of hatchery-reared fish to the fishery.
c. Evaluate trends of the fisheries and recommend management procedures.

TECHNIQUES USED:

Creel Census

The creel census was similar to that used during the previous 2 years.

Temporary personnel censused 12 landings between January 13 and November 30. Each landing was censused three Saturdays, three Sundays, and three weekdays per 46-day period. The annual census was divided into 21 two-week intervals to separate error due to seasons and to provide a seasonal catch comparison.

Expansion of the census data was projected by class-day for 2-week intervals for the entire year. For example, I defined an angler man-day as one angler fishing one day irregardless of actual time spent fishing. Projection to estimated angler man-days is obtained by multiplying the number of interviewed anglers on a given day by the number of class-days (either weekdays or weekend days) within a 2-week interval. In previous reports, angler man-days were referred to as the total number of anglers.

Hope was not censused in 1973. However, I added previous percentage estimates from this landing to the annual data.

Marked Kamloops Rainbow Releases

Hatchery personnel have released 545,221 Kamloops rainbow in Lake Pend Oreille and its tributaries since 1968 and 89% of these have been marked. They also planted 1,915,162 unmarked Kamloops fry and 3,159,526 unmarked Dolly Varden fry.

FINDINGS:

Kokanee Catch

Sport and Commercial

In 1973, anglers fished an estimated 211,034 hours during 46,582 man-days to

catch 337,574 fish between January 13 and November 30 (Table 1). Eighty-three percent of the anglers sought kokanee which made up 97% of the estimated catch while 27% sought trout, which comprised 2% of the estimated catch. The 1951-1973 pressure and catch statistics are summarized in Appendix I.

Resident Sport Harvest

Resident sport anglers fished 44% (92,099) of the estimated effort (hours), harvested 39% (133,265) of the estimated catch, and 39% (127,291) of the kokanee catch (Table 2).

Nonresident Sport Harvest

Nonresident sport anglers fished 54% (115,292) of the estimated effort, harvested 59% (198,628) of the estimated catch, and 59% (195,767) of the kokanee catch (Table 3).

Commercial Harvest

Commercial anglers fished 2% (3,643) of the estimated effort, harvested 2% (5,681) of the estimated catch, and 2% (5,681) of the kokanee catch (Table 4).

Catch Rates

Interviewed anglers seeking kokanee fished 39,478 hours to catch 76,545 kokanee and averaged 1.9 fish per hour (Table 5). Kokanee anglers, incidentally, caught 632 other game fish, mostly rainbow and cutthroat.

Age Composition and Poundage

At intervals, throughout the year, project personnel measured 2,569 angler-caught kokanee to assess age and growth of the fish (Table 6). Length distributions of these fish indicate the range of sizes for each age class and contribution of each year class to the fishery. An additional 358 spawning kokanee averaged 10.2 inches in length.

The 1973 kokanee harvest consisted of 1968 age class (93%) and 1969 age class (7%) fish (Table 7).

In 1968 year class made up 95% (38 tons) of the total 1973 kokanee poundage while the 1969 year class made up 5% (2 tons). There was no contribution to the catch from the 1970 year class.

Trout Catch

Kamloops Rainbow

In 1973, sport anglers seeking Kamloops rainbow expended an average of 57.9 hours to catch each fish and 93.6 hours to catch each trophy fish (Table 8). They harvested 4, 422 Kamloops rainbow including 663 trophy fish.

Measured Kamloops (961) ranged between 6 and 35.5 inches with an average length of 14.2 inches. Trophy Kamloops (17 inches and over) averaged 27.7 inches.

Marked Kamloops

Hatchery personnel have released 545,221 Kamloops rainbow in Lake Pend Oreille and its tributaries since 1968 of which 89% have been marked (Table 9). To date, an estimated 311 of 485, 438 clipped fish have been caught (one of every 1,561 released).

Since 1969, census personnel have observed 70 fin-clipped Kamloops. These fish ranged between 8 and 17.8 inches and averaged 11.4 inches in length. Only one of the 631 trophy Kamloops observed by census personnel during the past 3 years was clipped.

Anglers seeking other species, caught all of the clipped returnees indicating light pressure on the smaller rainbow. In 1973, 1% of the interviewed Kamloops anglers sought small rainbow.

Low returns of marked Kamloops suggest poor survival or lack of angler interest.

Other Trout

Anglers seeking trout expended 16.6 hours per fish in 1973 (Table 10). In 1973, anglers harvested an estimated 751 Dolly Varden (including 503 trophy fish), 973 cutthroat trout, and 7 brown trout.

Dolly Varden measurements(197) ranged between 10 and 35 inches with an average length of 19.5 inches. Measurements from 131 trophy Dolly Varden (17 inches and over) averaged 21.8 inches.

Cutthroat (235) measured between 8 and 16.5 inches with an average length of 12.1 inches.

Trophy brown trout (3) ranged between 28 and 31 inches and averaged 29.2 inches in length. All brown trout observed in the creel were incidental to the catch of anglers seeking other species.

Angler Residency

During the creel census, project personnel interviewed 10,798 anglers to determine their home residency (Appendix II). About 54% (5,797) of the anglers came from the Pacific states and 44% (4,799) resided in the Mountain states with 42% (4,559) from Idaho alone (Figure l). Approximately 2% (202) came from other states and foreign countries.

Residents from the ten North Idaho counties comprised 98% (4,478) of the Idaho anglers (Figure 2). Bonner and Kootenai counties produced 76% (3,457) of the Idaho anglers and 32% of all anglers.

Johnson Creek Access Evaluation*

A reduction in angler access use at Sunnyside provided the opportunity to census another landing, the Johnson Creek Access.

* Information not included as part of the 1973 Lake Pend Oreille estimates.

Between July 19 and September 16, sport anglers using the Johnson Creek access caught 52,648 kokanee(Table 11). Only the Trestle Creek access recorded a higher kokanee catch (78,002).

Although the length of the creel census at Johnson Creek was significantly less than at other landings, the kokanee catch there could have increased the overall kokanee catch by 14% from 328,739 to 381,387.

Table 1. Estimated minimum fishing effort and harvest--Lake Pend Oreille, Idaho, 1973.

Period	Angler man-days	Hours	Kokanee	Cut-throat	Dolly Varden	Rain-bow	White-fish	Spiny-rays	Other trout	Non-game
Jan. 13-Feb. 27	761	2,895	1,935	-	-	-	-	-	-	-
Feb. 28-Apr. 14	1,385	6,506	8,868	-	-	-	3	-	-	-
Apr. 15-May 30	6,933	34,914	7,607	219	432	1,087	652	138	11	25
May 31-July 15	11,730	47,524	83,740	368	186	1,490	258	80	11	9
July 16-Aug. 30	12,474	54,220	113,399	180	61	861	42	381	2	26
Aug. 31-Oct. 15	11,691	56,627	112,676	168	30	761	15	624	-	11
Oct. 16-Nov. 30	1,608	8,348	514	38	42	223	200	190	11	-
Totals	46,582	211,034	328,739	973	751	4,422	1,170	1,413	35	71

Table 2. Resident sport fishing effort and harvest--Lake Pend Oreille, Idaho, 1973.

Period	Angler man-days	Hours	Kokanee	Cut-throat	Dolly Varden	Rain-bow	White-fish	Spiny-rays	Other trout	Non-game
Jan. 13-Feb. 27	298	1,073	290	-	-	-	-	-	-	-
Feb. 28-Apr. 14	746	3,446	4,264	-	-	-	3	-	-	-
Apr. 15-May 30	4,363	22,188	4,014	183	349	776	652	136	9	25
May 31-July 15	4,745	19,467	34,614	219	121	657	208	78	-	3
July 16-Aug. 30	4,184	18,648	37,206	113	48	310	8	307	-	-
Aug. 31-Oct. 15	4,803	23,117	46,857	155	17	416	15	564	-	11
Oct. 16-Nov. 30	790	4,160	46	4	33	153	200	190	11	-
Totals	19,929	92,099	127,291	674	568	2,312	1,086	1,275	20	39

Table 3. Nonresident sport fishing effort and harvest--Lake Pend Oreille, Idaho, 1973.

Period	Angler man-days	Hours	Kokanee	Cut-throat	Dolly Varden	Rain-bow	White-fish	Spiny-rays	Other trout	Non-game
Jan. 13-Feb. 27	120	399	98	-	-	-	-	-	-	-
Feb. 28-Apr. 14	202	840	470	-	-	-	-	-	-	-
Apr. 15-May 30	2,570	12,726	3,593	36	83	311	-	2	2	-
May 31-July 15	6,985	28,057	49,126	149	65	833	50	2	11	6
July 16-Aug. 30	8,290	35,572	76,193	67	13	551	34	74	2	26
Aug. 31-Oct. 15	6,888	33,510	65,819	13	13	345	-	60	-	-
Oct. 16-Nov. 30	818	4,188	468	34	9	70	-	-	-	-
Totals	25,873	115,292	195,767	299	183	2,110	84	138	15	32

Table 4. Commercial fishing effort and harvest--Lake Pend Oreille, Idaho, 1973*

Period	Angler man-days	Hours	Kokanee	Cut-throat	Dolly Varden	Rain-bow	White-fish	Spiny-rays	Other trout	Non-game
Jan. 13-Feb. 27	343	1,423	1,547	-	-	-	-	-	-	-
Feb. 28-Apr. 14	437	2,220	4,134	-	-	-	-	-	-	-
Apr. 15-May 30	-	-	-	-	-	-	-	-	-	-
May 31	-	-	-	-	-	-	-	-	-	-
Totals	780	3,643	5,681	-	-	-	-	-	-	-

* Commercial fishing closed on March 31.

Table 5. Catch data for interviewed anglers (including commercial) seeking kokanee--Lake Pend Oreille, Idaho, 1973.*

Month	Anglers	Hours	Kokanee	Other game fish	Kokanee per hour	All game fish per hour
January	44	159	64	-	0.4	0.4
February	220	853	489	-	0.6	0.6
March	258	1,158	899	-	0.8	0.8
April	197	840	734	2	0.9	0.9
May	549	2,163	1,473	77	0.7	0.7
June	1,251	4,782	8,001	169	1.7	1.7
July	1,915	7,589	14,626	149	1.9	1.9
August	1,802	7,656	17,967	102	2.3	2.4
September	2,660	12,675	29,902	115	2.4	2.4
October	342	1,603	2,390	18	1.5	1.5
November	-	-	-	-	0.0	0.0
Totals	9,238	39,478	76,545	632	1.9	2.0

*Does not include interview data from the Hope landing.

Table 6. Length frequency distribution of 2,569 kokanee from the catch and 358 kokanee from the spawning populations, Lake Pend Oreille, Idaho, 1973.

Length Group (mm)	1973 Creel Census						1973 Spawners		
	Jan. 13-Feb. 27	Feb. 28-Apr. 14	Apr. 15-May 30	May 31-July 15	July 16-Aug. 30	Aug. 31-Oct. 15	Males	Females	Totals
140-44									
145-49									
150-54									
155-59									
160-64	1	1							
165-69									
170-74	3								
175-79									
180-84	1		1	3					
185-89				5	5				
190-94	2	1		5	18	1			
195-99	4	2		4	30	2			
200-04	15	6	1	9	23	3			
205-09	30	12	3	13	9	3			
210-14	29	35	10	30	14	8			
215-19	65	43	12	35	17	7			
220-24	62	73	16	57	27	10			
225-29	44	63	32	80	48	3			
230-34	24	40	51	113	68	9		2	2
235-39	13	16	22	109	87	22		2	2
240-44	3	6	16	75	104	57	2	16	18
245-49	3	2	2	43	65	68	8	28	36
250-54				17	57	98	23	43	66
255-59			2	1	21	98	31	31	62
260-64				1	5	83	39	29	68
265-69					1	63	41	11	52
270-74						41	25	2	27
275-79	1				1	15	17	1	18
280-84						7	6		6
285-89			1			2	1		1
Totals	300	300	169	600	600	600	193	165	358

Table 7. Estimated minimum catch and poundage of kokanee by year class--Lake Pend Oreille, Idaho, 1973.

Period	Estimated number of kokanee caught	Year class in the catch					
		1968			1969		
		Percent	Number	Pounds	Percent	Number	Pounds
Jan. 13 - Feb. 27	1,935	98	1,896	360	2	39	3
Feb. 28 - Apr. 14	8,868	100	8,868	1,774	0	0	0
Apr. 15 - May 30	7,607	100	7,607	1,597	0	0	0
May 31 - July 15	83,740	98	82,065	17,234	2	1,675	201
July 16 - Aug. 30	113,399	86	97,523	23,406	14	15,876	2,223
Aug. 31 - Oct. 15	112,676	94	105,915	31,774	6	6,761	1,217
Oct. 16 - Nov. 30	514	94	483	145	6	31	6
Total number	328,739		304,357			24,382	
Total pounds				76,290			3,650
Percent of total number (weighted)		93			7		

Table 8. Catch data for interviewed anglers seeking Kamloops rainbow trout (all sizes), Lake Pend Oreille, Idaho, 1973*

Month	Anglers	Hours	Kamloops rainbow	Other trout	Other game fish	Kamloops rainbow per hour	All trout per hour	All game fish per hour
April	477	2,923	49	23	5	0.02	0.02	0.03
May	766	4,058	63	26	3	0.02	0.02	0.02
June	309	1,567	36	8	11	0.02	0.03	0.04
July	191	945	5	4	-	0.01	0.01	0.01
August	157	636	16	12	-	0.03	0.04	0.04
September	195	855	13	10	-	0.02	0.03	0.03
October	304	1,532	25	11	-	0.02	0.02	0.02
November	170	919	25	5	-	0.03	0.03	0.03
Totals	2,569	13,435	232**	99	19			
Average (weighted)						0.02	0.02	0.03

*Does not include interview data from the Hope Landing.
**Includes 143 trophy Kamloops rainbow caught in 13,391 hours.

Table 9. Total marked Kamloops rainbow releases and returns of marked Kamloops rainbow to the creel, Lake Pend Oreille, Idaho, 1968 - present.

Year	Adipose clip only	Adipose combination clip*	Total clipped	Total released	Percent clipped	Estimated number returned: Adipose clip only	Estimated number returned: Adipose combination clip	Total returned
1968	141,752	-	141,752	144,002	98	-	-	-
1969	100,530	-	100,530	119,676	84	51	-	51
1970	13,390	71,230	84,620	89,180	95	14	-	14
1971	510	32,315	32,825	66,652	49	128	2	130
1972	-	56,237	56,237	56,237	100	23	-	23
1973	-	65,255	69,474	69,474	100	8	85	93
Totals	256,182	225,037	485,438	545,221	89	224	87	311

*An adipose combination clip is either an adipose-right ventral or adipose-left ventral fin-dip.

Table 10. Catch data for interviewed anglers seeking trout, all species combined, Lake Pend Oreille, Idaho, 1973.*

Month	Anglers	Hours	Trout	Other game fish	Trout per hour	All game fish per hour
April	567	3,344	138	12	0.04	0.04
May	952	4,875	289	36	0.06	0.07
June	387	1,832	164	24	0.09	0.10
July	231	1,119	78	26	0.07	0.09
August	171	703	59	40	0.08	0.14
September	230	1,010	105	9	0.10	0.11
October	333	1,608	65	10	0.04	0.05
November	170	919	30	-	0.03	0.03
Totals	3,041	15,410	928	157		
Average (weighted)					0.06	0.07

*Does not include interview data from the Hope landing.

Table 11. Estimated minimum catch of kokanee by sport anglers by census landing--Lake Pend Oreille, Idaho, 1973.

SOUTH END	
Boileaus	45,733
Bubbs	20,930
Farragut	46,975
J.D.'s	15,672
MacDonalds	38,511
Reeds	17,029
NORTH END	
Ellisport	30,555
Garfield	17,084
Glengary	3,594
Hope	3,255
Johnson	52,648
Sandpoint	3,645
Sunnyside	2,073
Trestle	78,002

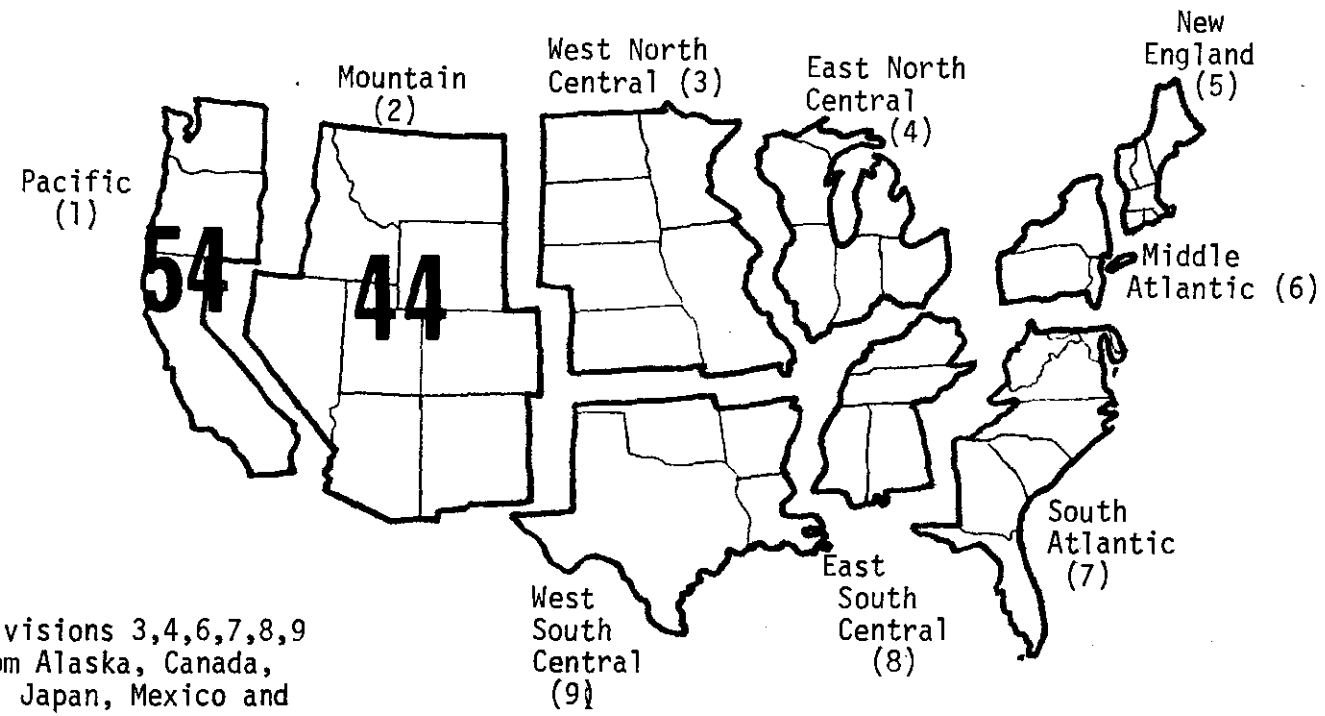


Figure 1. Percent of Lake Pend Oreille anglers by divisional residency, Lake Pend Oreille, Idaho, 1973.

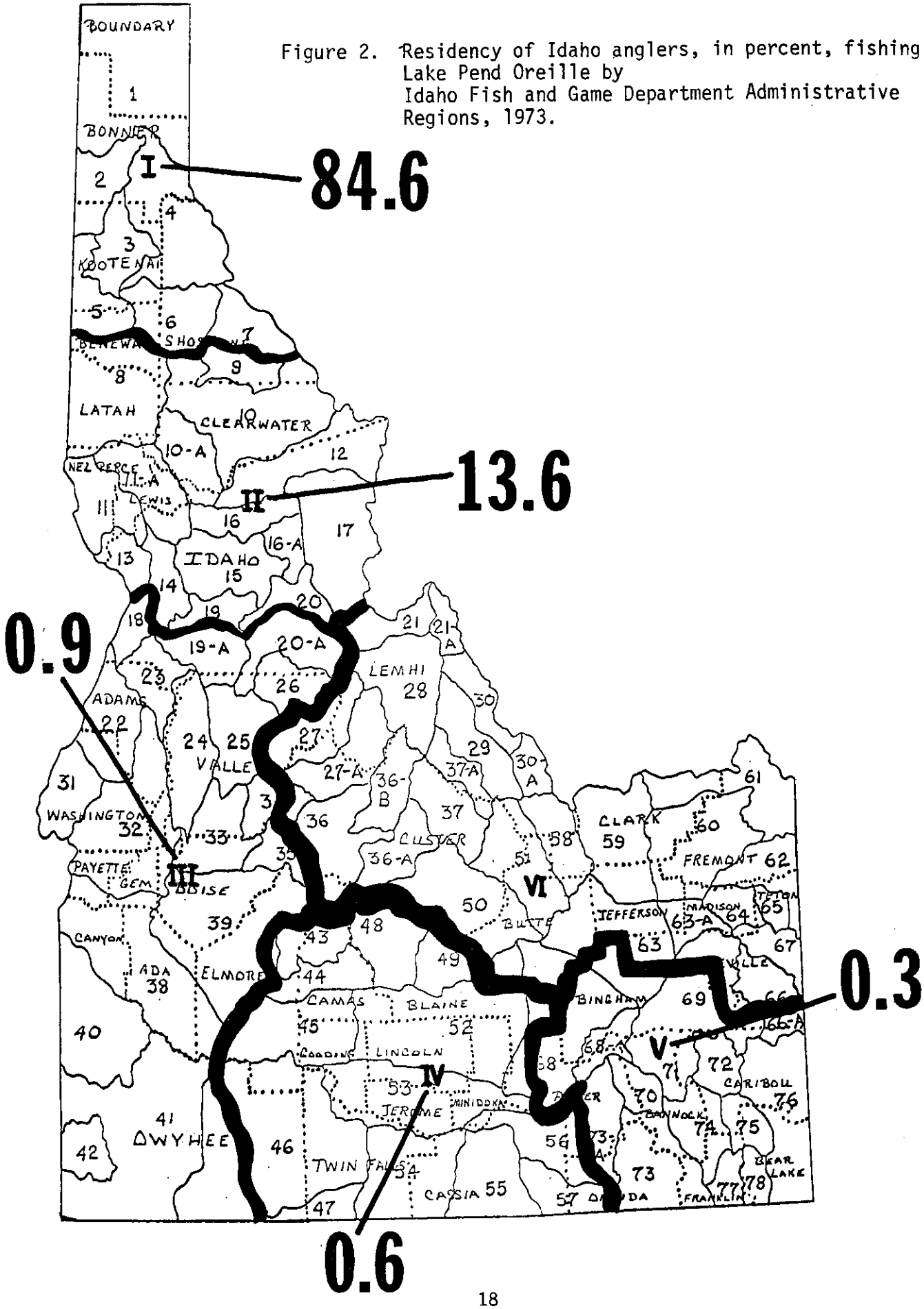


Figure 2. Residency of Idaho anglers, in percent, fishing Lake Pend Oreille by Idaho Fish and Game Department Administrative Regions, 1973.

Table 1. Estimated minimum number of angler man-days by license class, Lake Pend Oreille, Idaho, 1951 - present.

Year	Total	Resident	Nonresident	Commercial
1951	60,172	--	--	--
1952	57,814	26,836	30,051	927
1953	99,855	47,786	44,877	7,192
1954	90,566	40,956	41,619	7,991
1955	67,645	31,386	32,257	4,002
1956	87,813	45,432	38,006	4,375
1957	72,355	35,207	34,229	2,919
1958	88,453	45,532	36,862	6,059
1959	75,057	36,671	34,914	3,472
1960	77,162	35,564	36,385	5,213
1961	81,387	33,648	42,453	5,286
1962	59,379	23,656	31,348	4,375
1963	72,221	31,788	35,805	4,628
1964	66,225	26,703	35,295	4,227
1965	58,263	27,440	26,256	4,567
1966	65,340	24,710	37,976	2,654
1967	54,699	20,564	31,559	2,576
1968	55,414	18,379	35,492	1,543
1969	45,025	17,549	26,606	870
1970	61,815	21,944	37,715	2,156
1971	60,137	23,751	33,790	2,596
1972	50,506	21,214	26,971	2,321
1973	46,582	19,929	25,873	780

Table 2. Estimated minimum number of hours fished by license class--Lake Pend Oreille, Idaho, 1951 - present.

Year	Total	Resident	Nonresident	Commercial
1951	330,923	-	-	-
1952	308,850	133,539	169,372	5,939
1953	522,692	234,173	242,764	45,755
1954	459,271	189,920	221,512	47,839
1955	327,551	139,639	163,819	24,093
1956	406,538	196,226	181,397	28,915
1957	331,476	148,236	165,556	17,684
1958	400,683	192,199	171,033	37,451
1959	345,406	162,296	162,830	20,280
1960	372,266	162,531	176,806	32,929
1961	384,702	156,142	192,610	35,950
1962	274,554	108,380	138,339	27,835
1963	350,128	154,371	165,126	30,631
1964	314,220	125,842	164,446	23,932
1965	281,230	128,817	126,334	26,079
1966	295,781	113,085	166,206	16,490
1967	245,837	95,147	133,442	17,248
1968	242,859	83,200	150,157	9,502
1969	197,202	83,349	109,106	4,747
1970	261,785	91,878	157,446	12,461
1971	265,514	107,753	141,844	15,917
1972	222,908	96,097	113,475	13,336
1973	211,034	92,099	115,292	3,643

Table 3. Estimated minimum catch of kokanee by license class--Lake Pend Oreille, Idaho, 1951 - present.

Year	Total	Resident	Nonresident	Commercial
1951	820,486	-	-	170,500
1952	514,913	183,657	268,116	63,140
1953	1,335,881	412,288	382,593	541,000
1954	1,232,916	326,568	362,844	543,504
1955	650,375	181,492	228,610	240,273
1956	1,092,651	423,092	240,294	429,265
1957	751,113	256,280	277,699	217,134
1958	1,197,426	365,082	359,132	473,212
1959	1,161,913	377,065	332,001	452,847
1960	1,039,200	320,041	278,571	440,588
1961	991,955	257,362	305,361	429,232
1962	650,960	168,847	190,039	292,074
1963	1,049,339	359,677	314,291	375,371
1964	1,162,625	357,152	452,962	352,511
1965	1,007,292	385,007	319,034	303,251
1966	808,744	220,317	351,403	237,024
1967	710,312	218,629	290,081	201,602
1968	618,405	207,058	288,454	122,893
1969	483,292	180,294	242,109	60,889
1970	654,848	173,672	367,981	113,195
1971	590,058	189,377	242,383	158,298
1972	521,048	172,952	186,499	161,597
1973	328,739	127,291	195,767	5,681

Table 4. (Part 1) Lake Pend Oreille kokanee catch by month, 1951 - 1958.

Year	Kokanee catch by month											Total catch
	January	February	March	April	May	June	July	August	September	October	November	
1951		←——315,852——→		27,781	50,508	183,882	88,248	43,706	84,234	26,275		820,486
1952				14,379	126,979	107,521	79,405	39,056	66,172	81,401		514,913
1953		50,466	255,549	203,791	190,203	234,300	140,141	56,206	95,779	107,144	2,302	1,335,881
1954		8,963	96,637	180,081	358,689	203,896	192,094	50,018	93,946	46,806	1,786	1,232,916
1955		24	23,762	61,515	200,674	99,188	23,388	67,792	136,641	37,383	8	650,375
1956	433	3,359	212,597	299,637	226,911	64,036	66,619	55,985	142,753	20,289	32	1,092,651
1957		39,885	85,926	129,715	102,188	38,454	42,147	88,447	196,838	27,499	14	751,113
1958	26,400	105,974	81,481	200,611	227,203	42,356	101,736	117,508	223,693	70,459	5	1,197,426

Table 4. (Part 2). Lake Pend Oreille kokanee catch by period, 1959 - present.

Year	Kokanee catch by period							Total catch
	Jan 13-Feb 27	Feb 28-Apr 14	Apr 15 May 30	May 31-July 15	July 16-Aug 30	Aug 31-Oct 15	Oct 16-Nov 30	
1959	---	233,599	380,173	270,127	113,144	158,622	6,248	1,161,913
1960	19,042	287,126	307,945	131,586	72,112	201,303	20,086	1,039,200
1961	77	239,822	347,946	98,447	41,587	260,326	3,750	991,955
1962	24,005	117,808	240,200	79,608	72,440	103,005	13,894	650,960
1963	212,175	130,142	261,372	55,511	150,634	221,355	18,150	1,049,339
1964	90,162	160,011	293,894	196,037	145,106	273,720	3,695	1,162,625
1965	120,193	287,280	157,907	147,746	36,761	254,740	2,665	1,007,292
1966	72,766	146,076	170,690	95,038	139,628	178,218	6,328	808,744
1967	125,435	62,274	107,762	169,990	73,220	165,761	5,870	710,312
1968	126,179	4,968	99,692	136,559	114,754	136,235	18	618,405
1969	9,266	10,378	124,940	92,529	105,186	135,507	5,486	483,292
1970	50,050	65,378	50,296	190,340	157,069	141,132	583	654,848
1971	24,497	74,938	145,830	167,243	68,129	108,092	1,329	590,058
1972	23,617	129,054	116,514	64,024	88,154	98,955	730	521,048
1973	1,935	8,868	7,607	83,740	113,399	112,676	514	328,739

Table 5. Catch per hour by month for interviewed anglers (including commercial) seeking kokanee, Lake Pend Oreille, Idaho, 1954 - present.

	Monthly catch per hour for kokanee											
Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Avg.
1954	-	0.8	4.5	5.9	5.2	2.8	2.4	1.4	1.5	2.5	1.3	2.9
1955	-	0.5	3.2	4.3	7.2	2.6	0.7	1.4	1.5	2.4	0.0	2.4
1956	3.5	6.5	7.5	6.2	6.2	1.7	1.1	1.4	2.3	2.7	0.2	3.3
1957	-	5.5	5.1	4.5	4.8	1.3	1.4	2.2	2.8	2.5	-	2.9
1958	7.9	3.4	4.6	8.1	5.2	1.4	1.9	2.6	3.7	3.3	1.0	3.6
1959	-	-	6.6	7.4	6.1	3.0	2.1	1.9	3.1	2.8	-	3.7
1960	0.9	5.3	7.8	4.1	6.4	2.3	1.1	1.6	2.0	2.5	0.3	3.2
1961	0.2	0.7	7.1	2.7	4.4	1.6	1.2	1.1	2.2	2.6	-	2.7
1962	-	5.2	2.5	4.8	4.9	1.4	1.2	1.5	1.7	3.7	0.0	2.6
1963	-	11.4	3.6	2.6	4.3	1.4	2.1	2.5	2.5	4.0	0.2	3.3
1964	3.5	7.3	6.4	4.4	8.6	3.0	1.8	3.1	4.1	3.2	3.7	4.5
1965	6.2	6.7	8.0	2.3	5.4	3.1	1.9	2.2	3.4	3.6	0.0	4.2
1966	11.6	7.1	4.4	0.4	4.8	1.9	1.6	2.6	2.7	2.6	-	3.1
1967	9.5	7.8	3.8	1.3	5.6	2.4	2.0	2.3	3.2	3.8	0.0	3.5
1968	13.3	6.4	0.1	3.7	3.9	2.8	1.7	2.4	2.7	2.4	-	2.9
1969	6.7	2.7	1.7	1.0	6.9	2.0	2.6	2.7	3.3	2.0	0.5	3.5
1970	0.7	3.9	6.2	0.8	3.1	2.4	2.7	3.0	2.9	2.4	0.0	2.9
1971	2.9	1.9	3.6	3.4	4.3	2.3	1.7	1.9	2.1	2.0	0.3	2.6
1972	8.9	6.0	6.1	2.0	4.0	2.1	1.7	2.0	2.3	1.4	1.0	2.8
1973	0.4	0.6	0.8	0.9	0.7	1.7	1.9	2.3	2.4	1.5	0.0	1.9

Table 6. Average kokanee size in inches at spawning time, Pend Oreille Lake, Idaho, 1950 - present.

Year	No. of females	Average length	No. of males	Average length	Total	Average length
1950	-	-	-	-	12	10.9
1951	29	11.3	22	11.9	51	11.5
1952	158	11.9	137	12.2	295	12.0
1953	949	11.3	942	11.9	1,891	11.6
1954	123	10.5	102	10.9	225	10.7
1955	181	10.2	193	10.7	374	10.4
1956	339	10.0	322	10.4	661	10.2
1957	-	10.0	-	10.4	-	10.2
1958	621	10.3	832	10.7	1,453	10.5
1959	451	10.5	563	10.9	1,014	10.7
1960	239	10.8	300	11.4	539	11.2
1961	341	11.0	408	11.4	749	11.2
1962	229	11.0	423	11.4	652	11.2
1963	160	10.5	141	11.0	301	10.7
1964	48	9.6	72	10.1	120	9.9
1965	88	10.5	110	10.2	198	10.3
1966	104	10.6	120	10.3	224	10.4
1967	80	10.0	79	10.5	159	10.2
1968	-	-	-	-	-	-
1969	-	-	-	-	103	10.2
1970	163	10.3	160	10.7	323	10.5
1971	150	10.3	150	10.7	300	10.5
1972	180	10.1	202	10.3	382	10.2
1973	165	10.0	193	10.4	358	10.2

Table 7. Relationship between kokanee catch and drawdown after November 15, Lake Pend Oreille, Idaho, 1951 - present.

Year	Catch	Drawdown (ft.)	Catch (+5 yrs.)
1951	820,000	-	1,093,000
1952	515,000	7.2	751,000
1953	1,336,000	1.4	1,197,000
1954	1,240,000	9.5*	1,162,000
1955	650,000	3.8	1,039,000
1956	1,093,000	2.4	992,000
1957	751,000	5.1	651,000
1958	1,197,000	2.9	1,049,000
1959	1,162,000	2.5	1,163,000
1960	1,039,000	3.0	1,007,000
1961	992,000	5.6	809,000
1962	651,000	3.4	710,000
1963	1,049,000	4.0	618,000
1964	1,163,000	5.4	483,000
1965	1,007,000	3.7	655,000
1966	809,000	5.6	590,000
1967	710,000	2.0	521,000
1968	618,000	4.0	329,000
1969	483,000	0.4	-
1970	655,000	1.4	-
1971	590,000	2.3	-
1972	521,000	1.2	-
1973	329,000	0.0	-

*Indicates year when no relationship is shown between drawdown and catch.

Table 8. Estimated minimum catch of kokanee, Kamloops, Dolly Varden, and cutthroat trout, Lake Pend Oreille, Idaho, 1951 - present.

Year	Kokanee	Kamloops	Trophy Kamloops	Dolly Varden	Trophy Dolly Varden	Cutthroat
1951	820,486	678		1,775		5,271
1952	514,913	535		2,393		5.850
1953	1,335,881	3,158		5,035		8,201
1954	1,232,916	2,533		3,660		5,322
1955	650,375	2,594		3,811		4,982
1956	1,092,651	3,251		3,288		5,343
1957	751,113	2,938		2,117		5,138
1958	1,197,426	5,286		1,348		5,881
1959	1,161,913	4,906		1,677		3,659
1960	1,039,200	9,626	1,380	2,616	1,491	3,730
1961	991,955	5,355	873	966	568	2,641
1962	650,960	6,556	1,136	1,434	817	2,615
1963	1,049,339	10,323	1,442	1,049	671	3,069
1964	1,162,625	4,942	870	929	502	1,757
1965	1,007,292	4,763	1,141	1,460	672	1,744
1966	808,744	4,978	1,040	1,199	740	2,040
1967	710,312	3,349	767	657	512	788
1968	618,405	4,169	832	624	387	782
1969	483,292	3,297	889	862	588	954
1970	654,848	4,419	1,105	640	493	1,256
1971	590,058	4,462	892	967	532	965
1972	521,048	3,384	880	928	504	1,114
1973	328,739	4,422	663	751	503	973

Table 9. Average lengths (in inches) and weights (in pounds) of trophy Kamloops rainbow and Dolly Varden, Pend Oreille Lake and Clark Fork River, Idaho, 1960 - present.

	Pend Oreille Lake						Clark Fork River					
Year	No. of Kamloops	Average length	Average weight	No. of Dolly Varden	Average length	Average weight	No. of Kamloops	Average length	Average weight	No. of Dolly Varden	Average length	Average weight
1960	89	26.0	-	112	21.7	-	-	-	-	-	-	-
1961	69	25.9	-	48	21.6	-	-	-	-	-	-	-
1962	85	25.4	-	59	21.4	-	-	-	-	-	-	-
1963	124	23.1	-	48	22.8	-	-	-	-	-	-	-
1964	81	26.5	-	53	23.4	-	-	-	-	-	-	-
1965	82	26.0	-	63	22.2	-	-	-	-	-	-	-
1966	87	25.7	-	60	21.6	-	-	-	-	-	-	-
1967	76	24.0	-	47	20.1	-	113	30.4	15.7	52	24.9	6.7
1968	70	25.8	-	43	21.2	-	59	29.8	14.1	89	22.4	5.1
1969	78	25.7	-	70	21.9	-	49	29.2	-	57	23.7	-
1970	92	25.6	-	55	22.1	-	44	30.9	-	101	23.0	-
1971	249	26.4	-	136	22.0	-	14	31.2	-	27	22.4	-
1972	237	27.3	10.9	138	20.4	5.0	28	30.3	15.1	10	25.6	7.7
1973	137	27.7	11.8	131	21.8	5.8	22	30.9	18.1	6	23.5	6.7
Average		26.0	11.4		21.6	5.7		30.2	15.5		23.8	5.7

APPENDIX II

Angler Residency (Divisional)--Lake Pend Oreille

Pacific		
California		1,014
Oregon		164
Washington		4,619
	Sub total	5,797
	Percent	53.7
Mountain		
Arizona		100
Colorado		19
Idaho		4,559
Montana		50
New Mexico		6
Nevada		39
Utah		24
Wyoming		2
	Subtotal	4,799
	Percent	44.4
West North Central		
Iowa		10
Kansas		6
Minnesota		9
Missouri		3
Nebraska		7
South Dakota		7
	Subtotal	42
	Percent	0.4

Angler Residency (Divisional)--Lake Pend Oreille

East North Central		
Indiana		2
Illinois		6
Michigan		13
Ohio		8
Wisconsin		10
	Subtotal	39
	Percent	0.4
New England		
Connecticut		4
Rhode Island		2
	Subtotal	6
	Percent	0.1
Middle Atlantic		
New Jersey		6
	Subtotal	6
	Percent	0.1
South Atlantic		
Florida		19
West Virginia		1
	Subtotal	20
	Percent	0.2
East South Central		
Kentucky		2
Mississippi		1
	Subtotal	3
	Percent	0.0

Angler Residency (Divisional)--Lake Pend Oreille

West South Central		
Oklahoma		31
Texas		24
	Subtotal	55
	Percent	0.5
Non-Continental States		
Alaska		2
Hawaii		2
	Subtotal	4
	Percent	0.0
Foreign Countries		
Canada		19
Japan		1
Mexico		6
Norway		1
	Subtotal	27
	Percent	0.2
	Total	10,798

Angler Residency (Idaho)--Lake Pend Oreille

Region 1--Panhandle		
Local Counties		
Bonner		1,625
Kootenai		1,832
	Subtotal	3,457
	Percent	75.8
Other Counties		
Benewah		15
Boundary		67
Shoshone		321
	Subtotal	403
	Percent	8.8
Region 2--Clearwater		
Clearwater		20
Idaho		1
Latah		223
Lewis		5
Nez Perce		369
	Subtotal	618
	Percent	13.6
Region 3--Western		
Ada		36
Canyon		4
	Subtotal	40
	Percent	0.9

Angler Residency (Idaho)--Lake Pend Oreille

Region 4--Magic Valley		
Blaine		2
Camas		2
Cassia		10
Gooding		3
Twin Falls		10
	Subtotal	27
	Percent	0.6
Region 5--Eastern		
Bannock		1
Bonneville		9
Madison		2
	Subtotal	12
	Percent	0.3
Region 6--Upper Snake		
Lemhi		2
	Subtotal	2
	Percent	0.0
	Total	4,559

JOB PERFORMANCE REPORT

State of Idaho Name: LAKE AND RESERVOIR INVESTIGATIONS

Project No. F-53-R-9 Title: Clark Fork River Fishery Investigations

Job No. IV-b

Period Covered: March 1, 1973 to February 28, 1974

ABSTRACT:

Several years of declining Kamloops catches from the Clark Fork River prompted a closure of the 1973 spring fishery and 66% reduction in season length for the fall fishery.

In 1973, October anglers fishing Clark Fork River caught an estimated 53 trophy Kamloops (17 inches or larger) and 16 trophy Dolly Varden.

Approximately 87% of the anglers fishing Clark Fork River resided in the Pacific and Mountain states with 13% living in other states. In Idaho, the three northern-most counties contributed nearly 77% of the state's anglers and 37% of all anglers fishing the river.

Submitted by;

Richard A. Irizarry Fishery
Research Biologist

RECOMMENDATIONS:

The creel census and its evaluation should continue on the Clark Fork River.

OBJECTIVES:

To estimate angling pressure and harvest of Kamloops and Dolly Varden on the Clark Fork River fishery.

To determine size and age composition of fish harvested.

To evaluate the fishery and its relationship to the Lake Pend Oreille fishery for Kamloops and Dolly Varden and recommend fisheries management procedures.

TECHNIQUES USED:

During 1973, I used a random stratified creel census on Clark Fork River to estimate the total catch of trophy Kamloops and Dolly Varden.

A census clerk interviewed anglers at a check station near the town of Clark Fork and at Johnson Creek access area. He operated the station 2 weekdays and 1 weekend day per week during the fishery.

FINDINGS:

Trophy Trout Catch

The census clerk interviewed 131 anglers who fished 774 hours to catch 23 trophy Kamloops and 8 trophy Dolly Varden (Table 1).

Anglers fished an estimated 1,755 hours during 296 man-days to catch 53 trophy Kamloops and 16 trophy Dolly Varden (Table 2).

Residents comprised 58% of the anglers. They expended 53% of the effort to catch 52% of the combined trophy fish harvest.

Nonresidents comprised 42% of the anglers and expended 47% of the effort to catch 48% of the combined trophy fish harvest

River vs. Lake Trophy Fishery

Interviewed anglers on the river averaged 33.1 hours per trophy Kamloops caught and 109. 7 hours per Dolly Varden. Anglers on the lake averaged 131.6 hours per trophy Kamloops caught and 107.6 hours per trophy Dolly Varden for a similar time period (September 29 to October 21, 1973).

River anglers fished an average of 5.9 hours per day while lake anglers averaged 5.5 hours.

Clark Fork River anglers caught an estimated 53 trophy Kamloops and 16 trophy Dolly

Table 1. Catch data for interviewed anglers seeking "trophy" fish species, Clark Fork River, Idaho, 1973.

License type	No. anglers	Hrs. fished	Fish caught	
			Kamloops	Dolly Varden
Resident	78	426	11	6
Nonresident	53	348	12	2
Total	131	774	23	8

Table 2. Estimated minimum number of angler man-days, hours fished, and catch of "trophy" fish species, Clark Fork River, Idaho, 1973.

License type	Angler man-days	Hrs. fished	Fish caught	
			Kamloops	Dolly Varden
Resident	171	932	24	12
Nonresident	125	823	29	4
Total	296	1,755	53	16

anglers caught an estimated 663 trophy Kamloops and 503 trophy Dolly Varden between April 28 and November 30.

Catch rates for anglers seeking Kamloops on the lake have remained relatively stable since1960 while the river fishery rates have declined since 1966 (Table 3).

Angler Residency

During the creel census, the check station clerk interviewed 203 anglers to determine their home residency (Appendix). Approximately 26% (53) of the anglers came from the Pacific states and 61% (124) resided in the Mountain states with 49% (99) from Idaho alone (Figure 1). About 13% (26) came from other states.

Residents from five north Idaho counties comprised nearly 81% (80) of the Idaho anglers (Figure 2). Bonner, Boundary, and Kootenai counties produced 77% (76) of the Idaho anglers and 37% of all anglers.

Table 3. Catch data for interviewed anglers seeking trophy Kamloops at Lake Pend Oreille and its tributary Clark Fork River, 1960 to present.*

	Lake Pend Oreille			Clark Fork River		
Year	Hours	Kamloops	Hrs./fish	Hours	Kamloops	Hrs./fish
1960	4,567	76	60.1		No census	
1961	4,066	64	63.5		No census	
1962	3,357	77	43.6		No census	
1963	4,831	65	74.3		No census	
1964	4,459	68	65.6		No census	
1965	3,849	81	47.5		No census	
1966	4,263	88	48.4	666	59	11.3
1967	4,219	66	63.9	1,519	71	21.4
1968	3,533	58	60.9	2,093	63	33.2
1969	4,106	68	60.4	1,945	48	40.5
1970	5,996	83	72.2	1,975	44	44.9
1971**	16,179	236	68.6	1,511	14	107.9
1972	16,566	234	70.8	1,940	37	52.4
1973	13,391	143	93.6	774	23	33.7

* Lake vs. river catch rates should not be compared since the lake census extends for seven months and the river census only 2½ months. However, the data suggests the trends of each fishery.

** A more intensive census commenced on Lake Pend Oreille in 1971 and would account for the increase catch data from previous years.

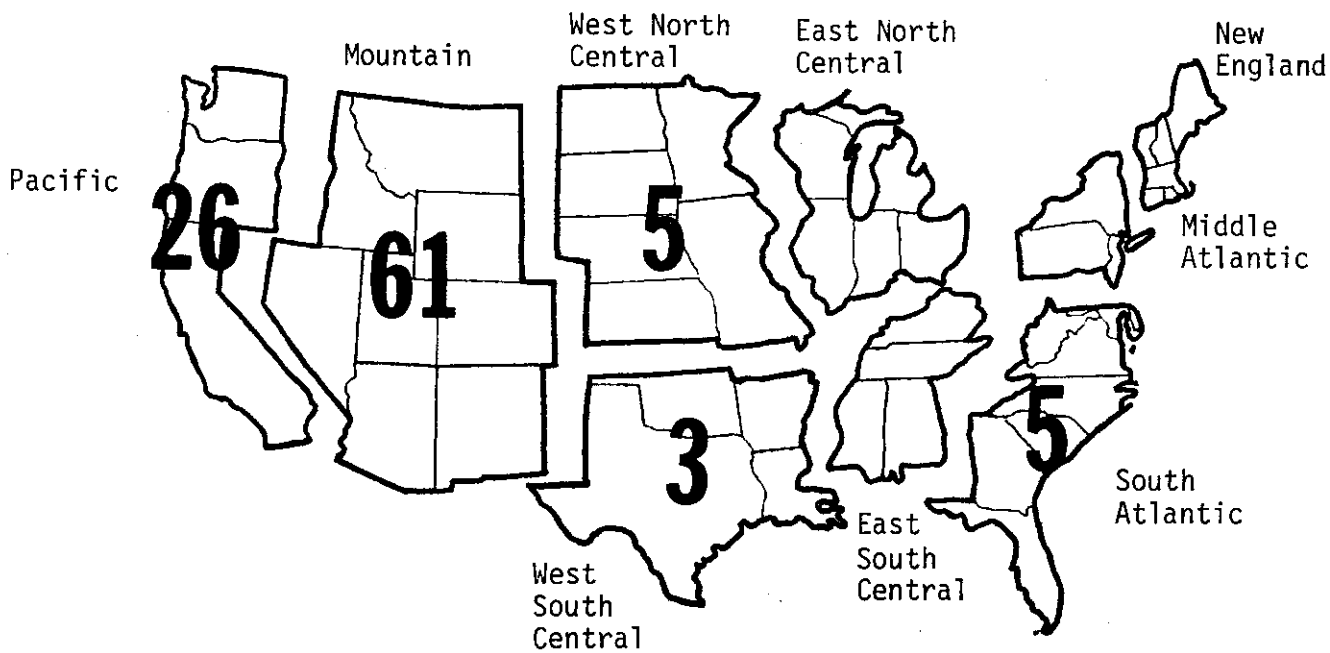
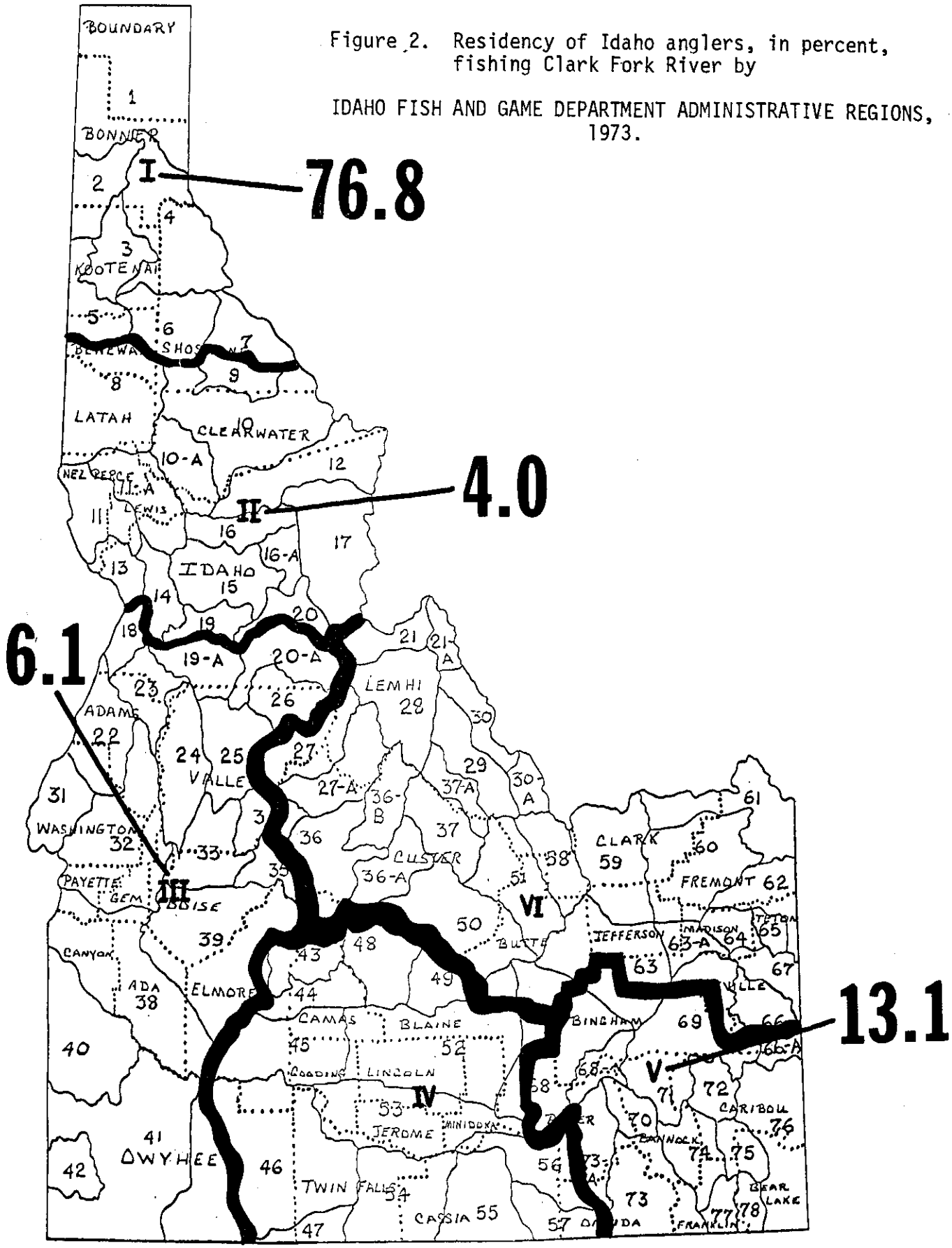


Figure 1. Percent of Clark Fork River anglers by divisional residency--Clark Fork River, Idaho, 1973.

Figure 2. Residency of Idaho anglers, in percent, fishing Clark Fork River by

IDAHO FISH AND GAME DEPARTMENT ADMINISTRATIVE REGIONS, 1973.



APPENDIX

Angler Residency (Divisional)--Clark Fork River

Pacific		
California		25
Oregon		11
Washington		17
	Subtotal	53
	Percent	26.1
Mountain		
Colorado		5
Idaho		99
Montana		17
New Mexico		3
	Subtotal	124
	Percent	61.1
West North Central		
Nebraska		7
South Dakota		4
	Subtotal	11
	Percent	5.4
South Atlantic		
Florida		10
	Subtotal	10
	Percent	4.9
West South Central		
Texas		5
	Subtotal	5
	Percent	2.5
	Total	203

Angler Residency (Idaho)--Clark Fork River

Region 1--Panhandle		
Bonner		46
Boundary		21
Kootenai		9
	Subtotal	76
	Percent	76.8
Region 2--Clearwater		
Lewis		2
Nez Perce		2
	Subtotal	4
	Percent	4.0
Region 3--Western		
Canyon		4
Valley		2
	Subtotal	6
	Percent	6.1
Region 5--Eastern		
Bear Lake		2
Bingham		2
Bonneville		9
	Subtotal	13
	Percent	13.1
	Total	99

JOB PERFORMANCE REPORT

State of Idaho Name: LAKE AND RESERVOIR INVESTIGATIONS

Project No. F-53-R-9 Title: Kokanee Spawning Trends

Job No. IV-c

Period Covered: March 1, 1973 to February 28, 1974

ABSTRACT:

Spawning escapement from both early and late-run kokanee was assessed in Lake Pend Oreille and its tributaries during the 1973-74 spawning season.

Early-run kokanee began spawning in Trestle Creek on September 3, 1973, and continued through October 2 when most spawning activity terminated. Fewer early-run kokanee spawned in Trestle Creek during the 1973 spawning season (maximum single count - 1,076) than spawned during the 1972 season (maximum single count - 5,000).

More late-run kokanee were observed spawning on the lakeshores and in the tributaries of Lake Pend Oreille in 1973-74 than were seen in 1972-73. Lakeshore spawning was mostly concentrated in the Bayview area where spawning was first observed on November 8, 1973. Spawning activity peaked in Bayview on December 13 with a count of 17,156 kokanee and was mostly completed by December 28.

Assessment of late-run tributary spawning escapement was hampered by higher than normal precipitation and subsequent runoff in November and December. Tributary spawning kokanee were first observed during the spawning season in Granite Creek on November 1, 1973 and last seen in Spring Creek on January 6, 1974.

Overall, by comparing maximum single counts of late-run kokanee made during the 1972-73 and 1973-74 spawning seasons there was a 2.8 to 1 increase in the number of spawners observed from 1972-73 to 1973-74.

The water level of Lake Pend Oreille stabilized November 15, 1973 at 2,053.1 feet and was not drawn below that level throughout the 1973-74 kokanee spawning and incubation period.

Author:

Bert Bowler
Fishery Research Biologist

RECOMMENDATIONS:

1. Continue monitoring kokanee escapement annually in Lake Pend Oreille and its tributaries by making counts every 5 days or as close to a 5-day interval as possible.

2. Construct an adequate weir at the mouth of Granite Creek and monitor kokanee escapement into the Granite Creek system. Estimate stream life of kokanee by tagging fish as they enter the weir and by daily assessing the survival of those tagged fish as they move into the drainage to spawn.

3. Evaluate the feasibility of removing the log jam (fish barrier) 2 miles upstream from the mouth of Trestle Creek.

4. Evaluate the feasibility of renewing and/or cleansing the spawning gravels in Spring Creek and Sullivan Springs.

5. Begin collecting otoliths from spawning kokanee throughout the drainage for age and growth measurements.

OBJECTIVES:

To develop methodology and arrive at an index of relative abundance of kokanee spawners for year-to-year trend comparisons.

To record the location and abundance of kokanee spawners and to ascertain if subpopulations exist.

To document the duration and peak time of kokanee spawning at each lake. To relate

reservoir water levels to lakeshore kokanee spawning.

To evaluate major changes in lake or stream areas used for kokanee spawning in 1973 as compared to those used during the 1950^{s}.

To evaluate suitability of beach and stream spawning materials and relate percentage of fines to use and egg mortalities.

TECHNIQUES USED:

We counted or estimated numbers of kokanee utilizing spawning areas of Lake Pend Oreille and its tributaries throughout the 1973-74 spawning season. Counts along the shorelines were made from an airplane, boat and by walking. We also used a boat with a glass observing window to note spawning activity in deep
water. Tributary counts were made by walking each tributary stream from its mouth to the upper extent of kokanee spawners except for the Clark Fork River. We made two counts in the Clark Fork River from Cabinet Gorge Dam to its mouth by drifting in two small boats, one on each side of the river. Counts were made when Washington Water Power Company reduced the flow at Cabinet Gorge Dam to 3,000 cfs. Kokanee were enumerated individually when possible but mostly they were counted in numbers of 10's and 100's because of their density.

We attempted to make each count at a 5-day interval but because of limited personnel and poor observation conditions, we could not maintain the 5-day schedule in all areas of the lake. John Coyle of the U.S. Army Corps of Engineers aided the survey by making kokanee counts from a boat in the north end of the lake.

An attempt was also made to utilize a temporary weir built on Granite Creek to count kokanee entering the Granite Creek system. Due to an abnormal amount of precipitation and resultant runoff in November and December, the weir was only operable during the first week of November.

FINDINGS:.

Early-Run Kokanee

Trestle Creek, the only known recipient of early spawning kokanee in the immediate Pend OreilleLake drainage, supported fewer kokanee in 1973 than in 1972. We first observed kokanee spawning in Trestle Creek September 3, 1973 and by October 2 spawning was mostly completed. On September 17, when the run peaked, we counted 1,076 kokanee in the drainage (Figure 1). Only one count was made in Trestle Creek in 1972 when an estimated 5,000 kokanee were counted September 7.

There is a log jam in Trestle Creek, about 2 miles upstream from its mouth, that is a migration block to ascending kokanee.

Late-Run Kokanee

More late-run kokanee were observed spawning on the shores and in the tributary streams of Lake Pend Oreille during the 1973-74 spawning season than were seen during the 1972-73 season.

We first observed shoreline spawning kokanee in the Bayview area November 8, 1973. Because Bayview had the highest concentrations of shoreline kokanee spawners throughout the spawning season, we placed most of our consistent
counting effort there. The peak count occurred on December 13 with 17,156 kokanee counted (Table 1; Figure 2). Other shoreline areas received few spawners (Table 1).

Because of the above normal precipitation and subsequent runoff during November and December, kokanee were difficult to count throughout most of the spawning season in the tributaries. Tributary spawning was first observed in Granite Creek on November 1, 1973, and last seen on January 6, 1974 in Spring Creek (Table 2). The most frequent tributary counts were made in Granite,
North Gold, South Gold, and Spring creeks (Table 1; Figures 3, 4, 5, respectively). We also observed a small run of kokanee in Cedar Creek where no kokanee were seen in 1972. A maximum of 3,520 kokanee were counted in the Clark Fork River on December 2 when the flow in the river was reduced to 3,000 cfs.

Lake Water Levels

The level of Lake Pend Oreille stabilized at 2,053.1 feet on November 15, 1973. The Army Corps of Engineers did not allow the lake level to drop below 2,053.1 feet throughout the 1973-74 kokanee spawning and incubation period.

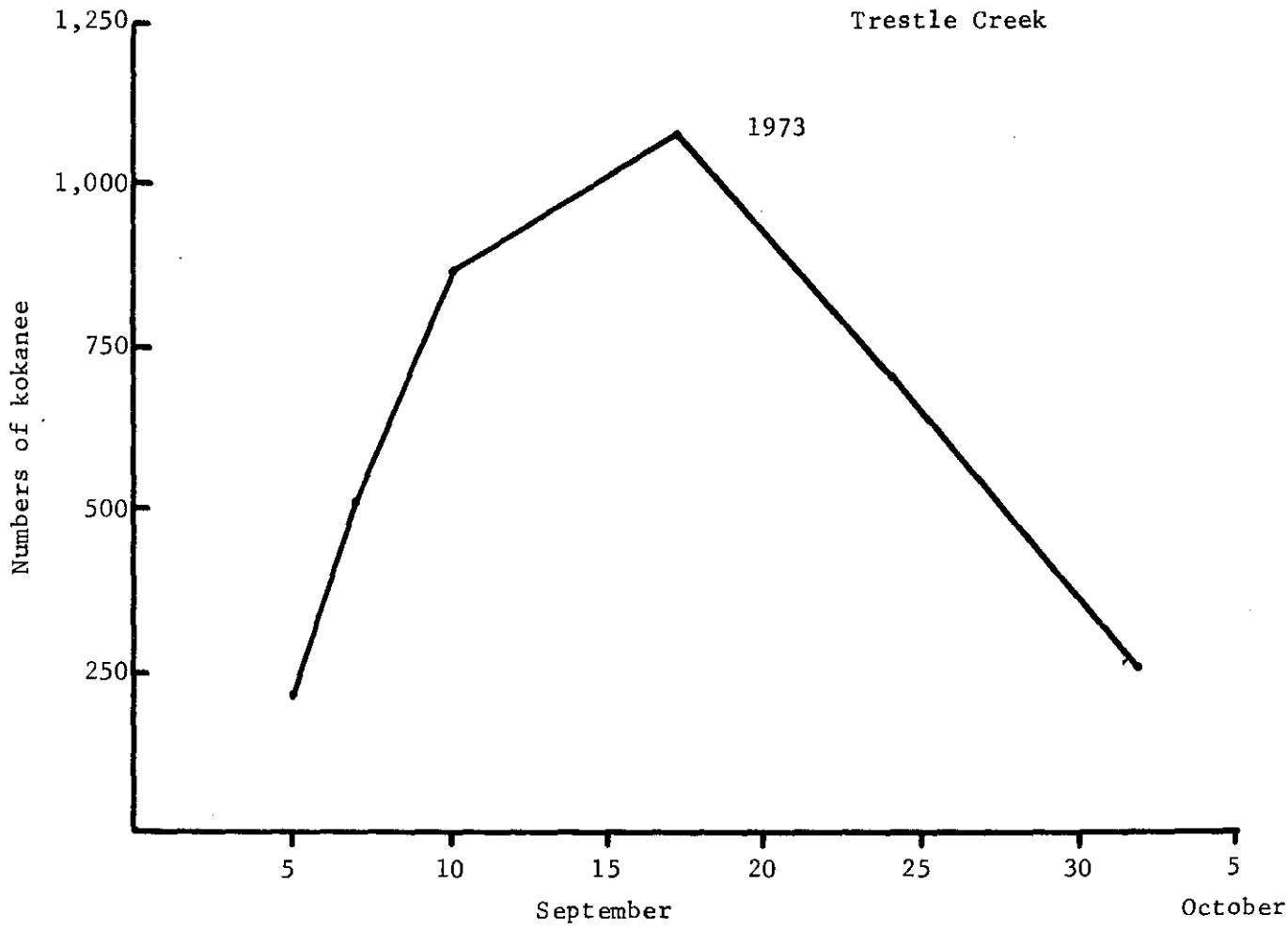


Figure 1. Numbers of early-run kokanee counted in Trestle Creek during the 1973 spawning season in Lake Pend Oreille.

Table 1. Numbers of spawning kokanee (late-run) counted on the shoreline areas of Lake Pend Oreille, 1973.

	November								
Shoreline	8	10	16	17	21	24	27	28	30
Bayview Beach (Entire)	190	250	2,210	4,970	9,935	11,605		9,725	
Breakdown:									
Bubb's						100		150	
Rusty Scupper			40	250	200	50		140	
J. D.'s			60			15			
Boileau's	175	250	350	2,000	2,000	3,500		3,000	
Bayview Resort	15		140	350	1,000	800		500	
Navy Yards			1,570	2,000	6,000	6,000		5,000	
MacDonald's			50	350	700	1,100		900	
Redman's				20	35	40		35	
Lakeview			50					15	
Ellisport Bay							525		
Trestle Creek Resorts							400		
Sunnyside									
Camp Bay									
Garfield Bay				400					400

Table 1. (Continued)

Shoreline	December 3	4	8	9	12	13	18	19	23	28
Bayview Beach (Entire)	10,310		15,120			17,156		10,770	5,200	1,930
Breakdown:										
Bubb's	300		400			350		300	300	50
Rusty Scupper	1,000		1,000			1,000		2,000	1,000	800
J. D.'s										
Boileau's	2,000		3,000			3,500		2,000	1,500	500
Bayview Resort	200		800			300		150	100	30
Navy Yards	6,000		7,000			8,000		5,000	2,000	500
MacDonald's	800		2,900			4,000		1,300	300	50
Redman's	10		20			6		20		
Lakeview						200				
Ellisport Bay				436						
Trestle Creek Resorts		1,000			300		500			
Sunnyside					25					
Camp Bay		617								
Garfield Bay		28								

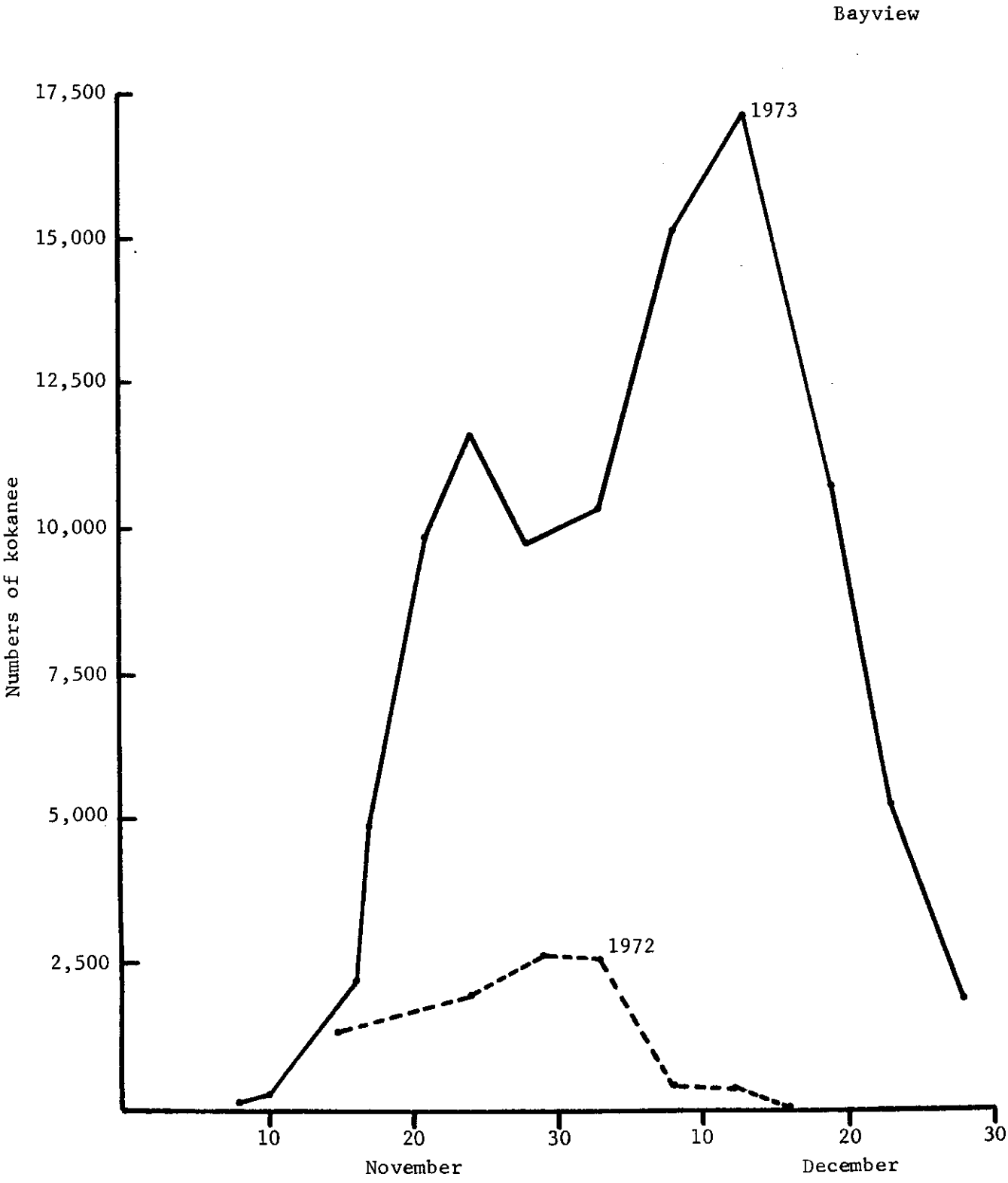


Figure 2. Numbers of lakeshore spawning kokanee counted in the Bayview area during the 1972-73 and 1973-74 late spawning season in Lake Pend Oreille.

Table 2. Numbers of spawning kokanee (late-run) counted in the tributaries of Lake Pend Oreille, 1973-74.

	November											
Stream	1	5	10	11	14	16	18	19	20	21	25	29
South Gold Creek						100						1,31
North Gold Creek			830			900						1,38
Cedar Creek									267			8
Granite Creek	500	4,150	3,650					10,631			10,218	
Johnson Creek Mouth												
Clark Fork River							2,000					
Mosquito Creek												
Lower Lightning Creek							500					
Spring Creek				22	1,165					2,843		
Trestle Creek												
Little Trestle Creek												

Table 2. (Continued)

Stream	December									January	
	1	2	3	8	9	11	12	13	14	4	6
South Gold Creek				843		1,875				5	
North Gold Creek				1,046					1,201	50	
Cedar Creek				51		47					
Granite Creek	7,213					5,142					
Johnson Creek Mouth		60									
Clark Fork River		3,520									
Mosquito Creek					250			503			
Lower Lightning Creek											
Spring Creek			4,025		3,149						126
Trestle Creek							10				
Little Trestle Creek					8						

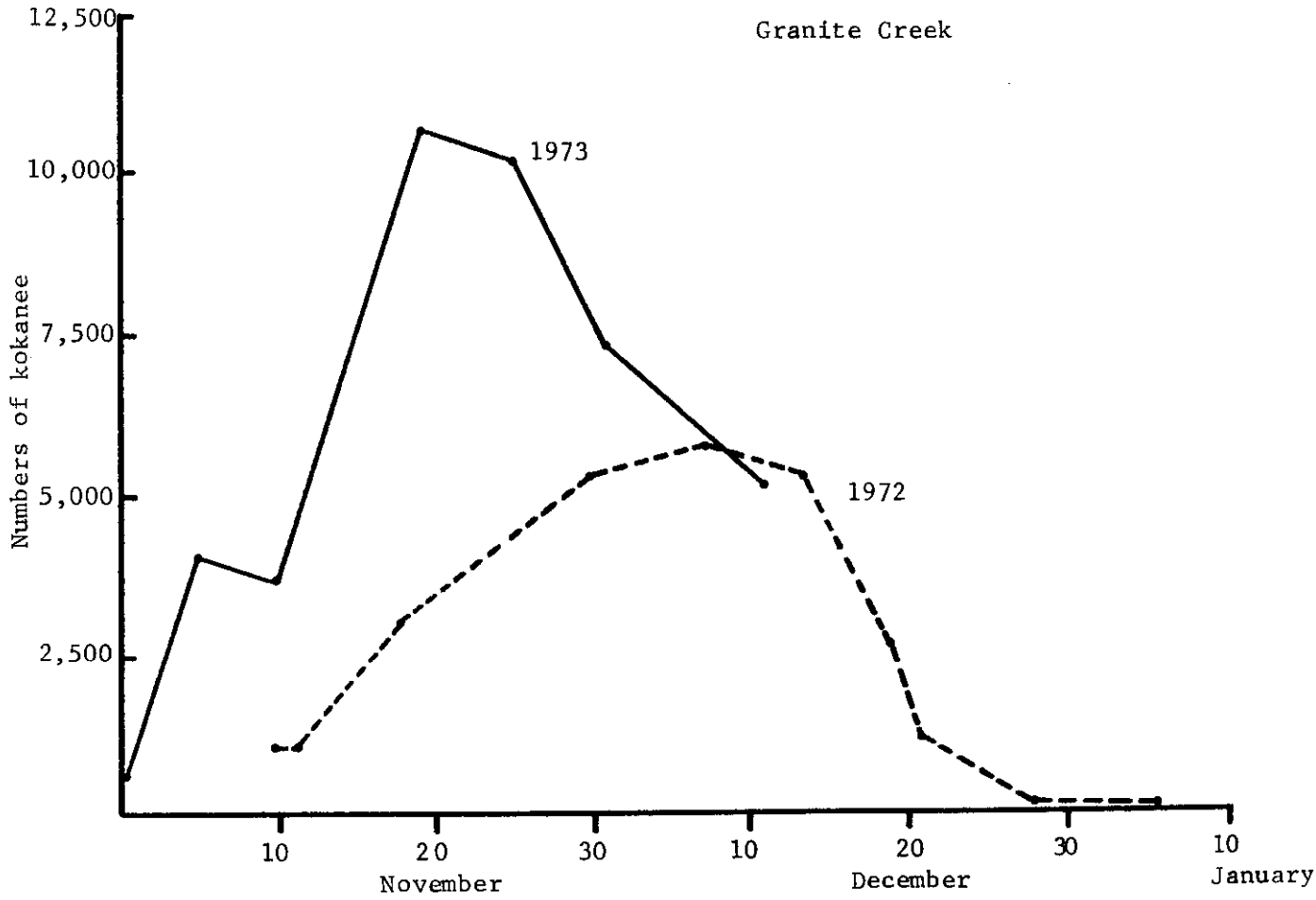


Figure 3. Numbers of spawning kokanee counted in Granite Creek during the 1972-73 and 1973-74 late spawning season in Lake Pend Oreille.

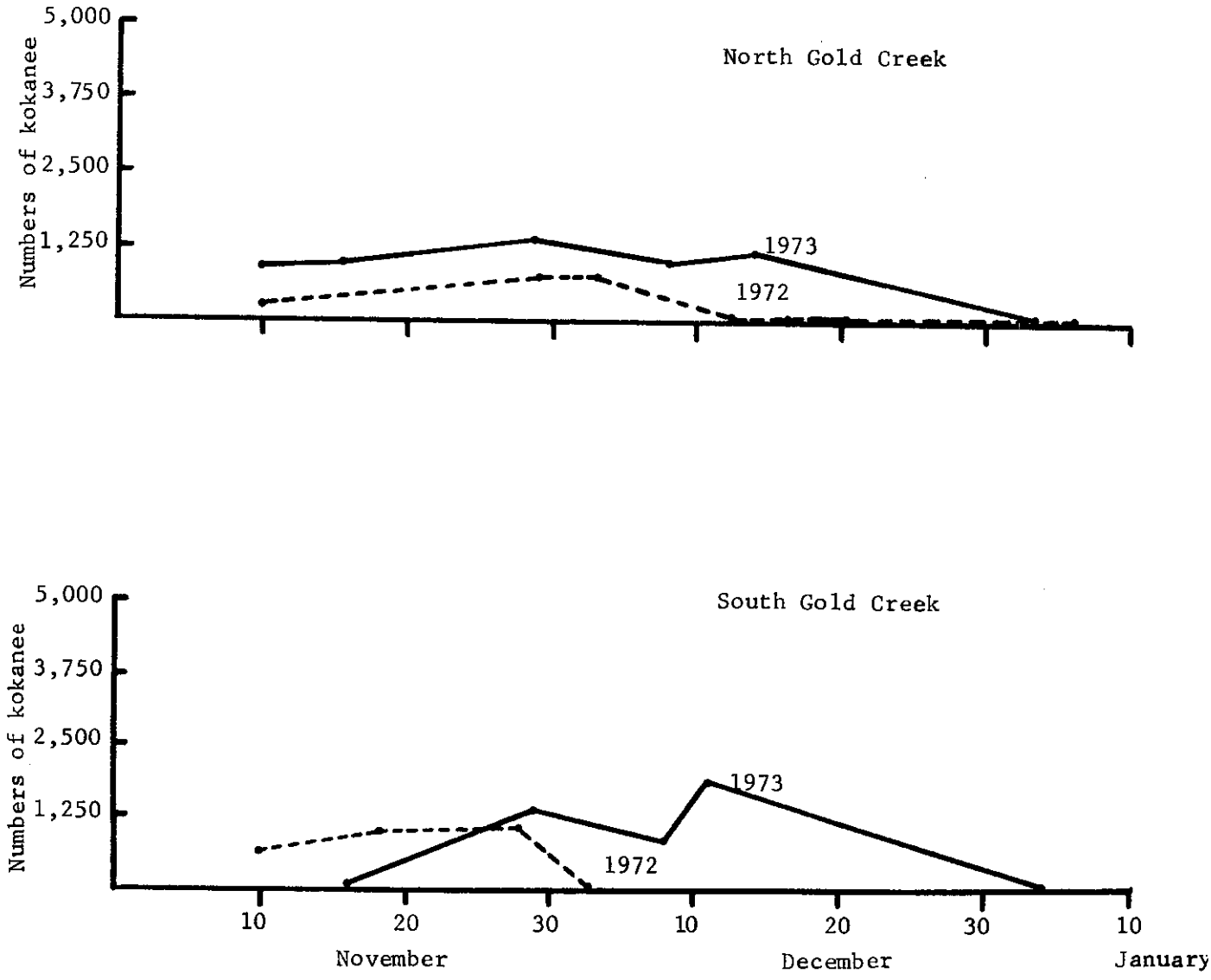


Figure 4. Numbers of spawning kokanee counted in North and South Gold creeks during the 1972-73 and 1973-74 late spawning season in Lake Pend Oreille.

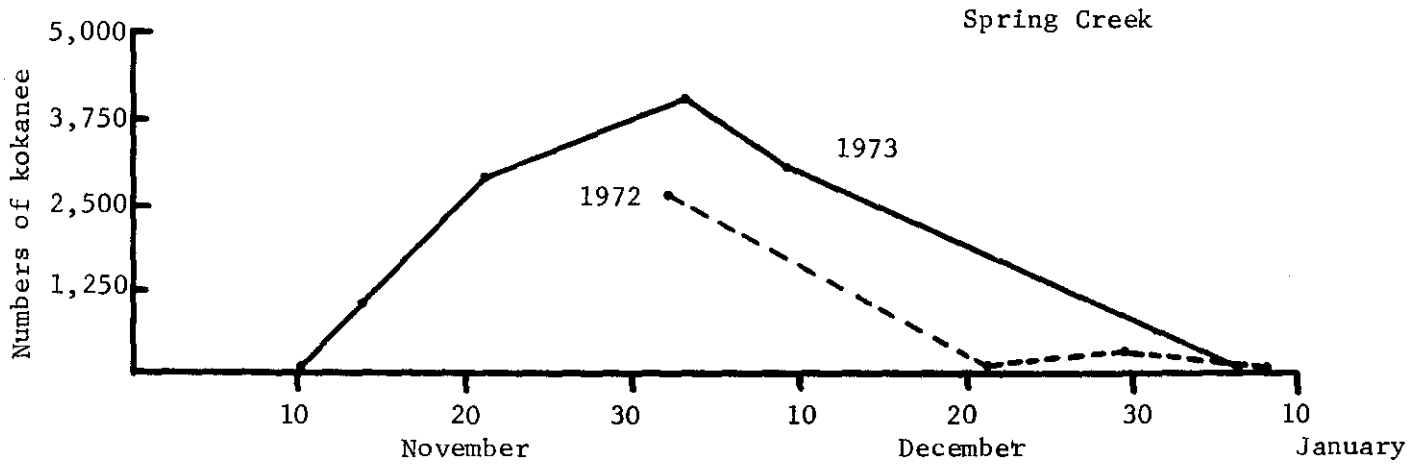


Figure 5. Numbers of spawning kokanee counted in Spring Creek during the 1972-73 and 1973-74 late spawning season in Lake Pend Oreille.

Minimum pool level in the lake is 2,051.0 feet. On December 14, 1973 the lake level was 2,053. 4 feet. On that day we counted 2,086 kokanee redds between 2,051.0 and 2,053.4 in the Bayview area from MacDonald's Resort to Bubbs' Resort. Those redds could have been potentially dewatered if the lake level was drawn to 2,051.0 feet.

Depth of Shoreline Spawning

We observed kokanee in the Bayview area spawning in depths of water ranging from several inches to 22 feet. With the glass-windowed boat, we were able to see kokanee actively spawning in 22 feet of water (range of our visibility) between MacDonald's Resort and the Navy yards.

Gravel Quality

Gibson (1973) found that spawning gravels from both tributaries and shore-line areas of Lake Pend Oreille contained a high percentage of sand and fines suggesting that embryo survival may be marginal in many of the spawning areas of the lake. Gross observations of gravel quality during the 1973-74 spawning season in Spring Creek and Sullivan Springs, the most heavily utilized spawning area of the Granite Creek drainage, indicate to me that high percentages of sand and fines in those gravel areas are reducing the survival of kokanee embryos.

DISCUSSION:

Kokanee spawning escapement is an important segment of the research concerning kokanee stock assessment now in progress on Pend Oreille Lake. Because of the lake's size and the time at which most of the kokanee spawn (November and December) we found it very difficult to get an accurate assessment of kokanee escapement in all areas of the lake. I feel that continued frequent counts of kokanee in the major spawning areas will provide the study with useful trends in evaluating spawning escapement in the future.

Comparing Kokanee Spawning Escapement in 1973 with Spawning Escapement in 1972 and in the 1950's

I compared maximum single counts of kokanee collected throughout the 1973-74 spawning season with the same counts made during the 1972-73 spawning season and found a 2.8 to 1 increase in the number of kokanee spawners observed from 1972-73 to 1973-74 (Table 3). The increase in escapement during the 1973-74 spawning season was likely due to the reduction in total kokanee harvest in 1973 because of the early closure (March 31, 1973) of the commercial fishing season. The 1968 to 1972 estimate of the average commercial kokanee catch was 100,011 fish. The estimated 1973 commercial harvest was 5,681 kokanee. Approximately 94,000 kokanee that could have been realized in the 1973 total kokanee harvest (from the commercial season had it been a full season) most likely contributed to the increase in the 1973-74 escapement.

It is difficult to compare spawning escapement trends in the 1950's with that of present trends because much of the early data is spread over several years and is not consistent from year to year in the same areas. Jeppson (1960) found that during the 1950's kokanee spawned in 27 different shoreline areas with some areas

Table 3. Maximun single (late-run) kokanee counts made during the 1972-73 and 1973-74 spawning season on Lake Pend Oreille and its tributaries.

Area	Maximum single counts	
Lakeshore	1972-73	1973-74
Bayview	2,626	17,156
Lakeview	4	200
Farragut	25	0
Idelwild Bay	13	0
Ellisport Bay	1	436
Trestle Creek Resorts	0	1,000
Sunnyside	0	25
Camp Bay	0	617
Garfield Bay	0	400
Subtotal	2,669	19,834
Tributaries		
South Gold Creek	1,030	1,875
North Gold Creek	744	1,383
Cedar Creek	0	267
Granite Creek	5,733	10,631
Clark Fork River	539	3,520
Mosquito Creek	0	503
Lightning Creek (Lower)	350	500
Spring Creek	2,610	4,025
Trestle Creek	1,293	18
Subtotal	12,299	22,722
Grand Total	14,968	42,556*

*2.8 to 1 increase from 1972-73 to 1973-74

averaging more than 1,000 kokanee annually. Runs of 100,000 kokanee were estimated in the Clark Fork River. Gibson (1973) noted that kokanee spawning trends in 1972-73 were considerably lower than those trends found in the 1950's. During the 1973-74 spawning season, kokanee escapement was higher than escapement levels of 1972-73 but still below those levels of the 1950's.

Methodology

To obtain continued annual trends of kokanee escapement, counts should be made every 5 days or as close to a 5-day schedule as possible, especially in areas of high kokanee abundance. For annual comparative purposes, escapement estimates from each of the spawning sites should be graphed with the dates of the respective counts (such as Figures 1-5). Also annual comparisons of escapement should barnacle by comparing maximum single kokanee counts collected during the entire spawning season (such as Table 3) from each of the spawning sites.

LITERATURE CITED:

Gibson, Harry, 1973. Lake Pend Oreille Kokanee Spawning Trends. Idaho Fish and Game Department. Job Progress Report, F-53-R-8, Job No. IV-c. 29pp.

Jeppson, Paul, 1960. Evaluation of Kokanee and trout spawning areas in Pend Oreille Lake and tributary streams. Idaho Fish and Game Department Final Report, F-3-R-10. 43-66 pp.

Supplement to Research Project No. F-53-R-9 Job No. IV-c TITLE:

Survival and intergravel movement of kokanee alevins as related to dewatering of a simulated lakeshore trough.

OBJECTIVE:

To assess survival and intergravel movement of kokanee alevins in a simulated lakeshore trough as the trough dewaters.

RECOMMENDATIONS:

Continue further research into movement and survival of kokanee alevins subjected to dewatering conditions by evaluating changes in:

1) percent gradient of the simulated lakeshore troughs;
2) gravel quality - percent fines (c¾ inch) in the gravel; and
3) stage of development of the kokanee alevins.

Evaluate kokanee survival from egg to swim-up fry when eggs and alevins have been subjected to dewatered gravel conditions.

INTRODUCTION:

Since the U.S. Army Corps of Engineers constructed Albeni Falls Dam on the Pend Oreille River in 1951, the water level of Pend Oreille Lake has fluctuated annually. The Corps generally lowers the lake in the fall (October and November) and holds the water level relatively stable until late spring to accommodate kokanee production.

Water drawdown after November 15, when kokanee are actively spawning in lakeshore areas, has ranged from .42 ft. to 9.5 ft. during 1953 to 1972. This drawdown subsequent to spawning has had an adverse affect on the kokanee population as evidenced by the negative correlation that exists between draw-down and catch of kokanee 5 years later.

The exception to this pattern occurred during the 1954-1955 spawning season and the kokanee catch that followed in 1959. However, the annual water regime during 1954-55 was unusual in that Lake Pend Oreille was held at flood level until March and lowered to its minimum level by mid-April. Indications are that kokanee productions in this instance was not seriously affected by this type of drawdown.

The quality and quantity of available area for kokanee production in Pend Oreille Lake would largely increase if the lake were held at flood level in the fall when kokanee are spawning. A spring drawdown followed closely by a rise in spring runoff could minimize losses in kokanee production if kokanee alevins could survive by moving through spawning gravels as the lake water recedes.

TECHNIQUES USED:

I erected four Heath Troughs, 8 feet in length, in a hatchery building at the Clark Fork Hatchery. Each trough was elevated at one end to stimulate a 2% sloping lakeshore (Figure 1). I filled one-half of each trough with gravel obtained from a nearby ditch that drains into Spring Creek. The gravel contained a high percentage of fines (Gk inch) which is comparable to many of the shoreline spawning areas of Pend Oreille Lake. Kokanee spawn in gravel of similar quality in Spring Creek. Two of the troughs could be dewatered with drain valves and the remaining two were used as control troughs. I filled all troughs with 50 gallons of water from Spring Creek. Daily range in water temperature measured 37 to 42 F.

I obtained 300 kokanee alevins that were approaching swim-up stage from incubator trays at the Sandpoint Hatchery. These alevins were progency from adults taken in Granite Creek, a tributary to Pend Oreille Lake, in December of 1972. I buried 30 alevins 2½ inches deep in the gravel in each trough and began to dewater two of the troughs at a rate of 2 gallons per hour. The other two troughs remained filled. I sifted through the gravel and assessed movement and survival of the alevins for 5 days (120 hours).

FINDINGS:

The two dewatered troughs emptied in 2 days (48 hours) except for 2 inches of water on the bottom of each trough. From these troughs I recovered 48 of the 60 alevins planted. Thirty alevins (50%) had moved 2 feet through the gravel toward the drain. I also recovered 18 alevins in the original redd area of which nine (50%) were dead after 3 days (72 hours) without water. Most of the alevins recovered in the redd area had moved toward the bottom of the trough where the gravel held more moisture. Twelve of the alevins were unaccounted for.

In the two control troughs I could account for only 17 of the 60 planted alevins after examining 1 cubic foot of gravel in the redd area. Five of those 17 alevins found were dead (70% survival). I found a few alevins in
the surface gravels, 3 feet from the redd area, and suspect that during the 5-day (120 hours) test period some of the alevins that were unaccounted for could have emerged and moved to other areas of the trough.

Although this experiment was limited in duration and in information collected, it suggest to me that kokanee alevins can move through spawning gravels as they are dewatered. Kokanee alevins may survive in dewatered gravels depending on duration spent in the dewatered gravel, wave action along the shoreline, amount of rainfall, and the absence of freezing air temperatures. Further testing should be conducted to better evaluate movement and survival of kokanee alevins under dewatered conditions.

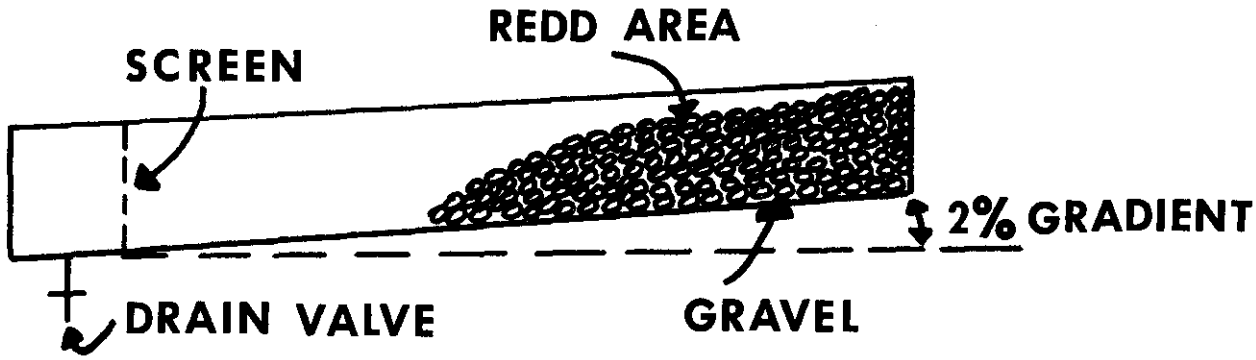


Figure 1. Simulated lakeshore trough.

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